

**U.S. HOUSE OF REPRESENTATIVES
COMMITTEE ON HOUSE ADMINISTRATION
AND
COMMITTEE ON SCIENCE**

Hearing Charter

Voting Machines: Will the New Standards and Guidelines Help Prevent Future Problems?

Wednesday, July 19, 2006

2:00 - 4:00 p.m.

2318 Rayburn

Purpose

The purpose of the hearing is to review new federal voluntary standards for voting equipment, which were issued late last year, to see if they are likely to improve the accuracy and security of voting, and to see if states are likely to adopt the standards.

The new standards, known as the Voluntary Voting Systems Guidelines (VVSg), were required by the Help America Vote Act (HAVA), which was enacted in 2002. Under the Act, the Election Assistance Commission (EAC) promulgates the standards, based on recommendations from the Technical Guidelines Development Committee (TGDC), which is chaired by the National Institute of Standards and Technology (NIST). The language in the Act regarding the standards was written by the House Science Committee and the House Administration Committee.

Witnesses

Ms. Donetta Davidson - Commissioner, Election Assistance Commission.

Dr. William Jeffrey - Director, National Institute of Standards and Technology.

Ms. Mary Kiffmeyer - Secretary of State for Minnesota.

Ms. Linda Lamone - Administrator of Elections, Maryland State Board of Elections.

Mr. John Groh - Chairman, Election Technology Council, Information Technology Association of America.

Dr. David Wagner - Professor of Computer Science, University of California at Berkeley.

Overarching Questions

The hearing will address the following overarching questions:

1. Are the new voting equipment standards, if adopted, likely to improve the accuracy and security of voting? What additional elements, if any, are needed to improve the standards? When should the standards be updated?
2. Are states likely to adopt the new voting equipment standards? What needs to be done, if anything, to make the new standards more useful for states and voting equipment manufacturers?
3. What is the status of certifying the labs, known as Voting System Testing Laboratories (VSTLs), that will test voting equipment to see if it complies with standards?
4. How will the new standards, particularly those sections that addressing human factors in voting, improve the usability and accessibility of voting systems?

Overview

- “The U.S. election system is highly decentralized, with primary responsibility for managing, planning, and conducting elections residing at the local jurisdictions—generally at the county level in most states, but some states have delegated election responsibility to subcounty governmental units. Subcounty election jurisdictions in 9 states account for about 75 percent of about 10,500 local election jurisdictions in the United States, but about 12 percent of the 2000 U.S. Census population. Local election jurisdictions vary widely in size and complexity, ranging from small New England townships to Los Angeles County, whose number of registered voters exceeds that of many states.”¹
- In October 2002, Congress enacted the *Help America Vote Act* (HAVA) (P.L. 107-252) to help address problems with voting machines that were brought to the public’s attention during the 2000 Federal election. HAVA encourages states and localities to eliminate punch card and lever voting machines by providing funds to the states to replace such equipment. Under HAVA, the states have received \$2.9 billion since 2003 to improve their elections processes, including by purchasing new voting equipment.
- HAVA established an Election Assistance Commission (EAC) to carry out aspects of HAVA. HAVA also established a number of basic requirements that voting machines and systems should meet, and a process by which new voluntary technical standards would be developed to ensure the reliability and accuracy of new voting equipment.
- Under HAVA, draft technical standards for voting system hardware and software are developed by the Technical Guidelines Development Committee (TGDC), a 14-member panel chaired by the Director of the National Institute of Standards and Technology (NIST). The TGDC recommends standards to the EAC, which approves and promulgates voluntary standards after review and input from a HAVA-established Standards Board (composed of state and local elections officials) and a Board of Advisors (appointed by

¹ GAO, Elections: *The Nation’s Evolving Election System as Reflected in the November 2004 General Election*, GAO-06-450 (Washington, D.C.: June 6, 2006).

associations representing governors, legislators, election directors, county officials, and others).

- The EAC approved the first edition of these standards, the 2005 Voluntary Voting Systems Guidelines (VVSG), in December 2005, but made the new standards (the 2005 VVSG) officially effective as of December 2007.
- The 2005 VVSG standards are voluntary. States are free to adopt them, in whole or in part, or not at all, as they see fit. Two earlier sets of voluntary standards promulgated by the Federal Election Commission (FEC), one promulgated in 1990 and one promulgated in 2002, are also available. The voluntary nature of these standards means that earlier standards are not necessarily superseded by the promulgation of updated standards. Some states have adopted the 1990 FEC standards, some states have adopted the 2002 FEC standards, some states are in the process of adopting the 2005 VVSG standards prior to their official effective date, some states have created their own standards, and a handful of states have not yet adopted standards for voting equipment.
- In a recent GAO report *The Nation's Evolving Election System as Reflected in the November 2004 General Election*, which included a survey of states, the GAO noted widespread inconsistency in the use of federal technology standards. For the November 2006 election, 11 states will require local jurisdictions to meet the 1990 FEC standards, 29 states will use the 2002 FEC standards, five will use the draft version of the 2005 VVSG, and the remainder did not require compliance with any federal standard, used a mix of federal standards, had not decided, or did not respond.
- In addition, the same GAO study noted that the performance of the voting systems – such as accuracy, reliability, and efficiency – was not consistently measured by states. Half of jurisdictions were collecting such data, meaning that there is no nationwide data on the performance of voting systems. Such information could help improve technology and elections in the future.

Issues

Timing of the 2005 VVSG Versus State Voting Systems Purchases - The transition to the new standards regime has been slow. The members of the EAC were not appointed until the end of 2003, and the EAC was initially provided with little funding to support its activities, including the development of standards. Furthermore, the TGDC could not meet until the EAC had been appointed, so the first TGDC meeting did not take place until July 2004. When the EAC began distributing funds to the states to help them purchase new voting equipment to replace punch-card and lever voting machines, the TGDC had not finished the process of developing the 2005 VVSG.

This has raised concerns that the new standards will not have a significant effect on the technology that is currently being purchased. Today, voting systems meet the 1990 or 2002 FEC standards, but none are certified to meet the 2005 VVSG standards. One of the reasons is that although the 2005 VVSG have been adopted, they are generally recognized to be incomplete.

The TGDC still needs to develop a comprehensive suite of tests that instruct vendors and accredited testing laboratories how to assess the performance of voting systems versus the standards. Another reason is that the EAC, when they approved the 2005 VVSG, included a 24-month grace period for states to adopt the standards, reasoning that the testing laboratories had yet to be accredited, there were no test suites to accompany the 2005 VVSG, and that states and vendors had not had time to review and digest the new standards. This means that the standards effectively do not apply until 2007. By this time, all of the Federal funds provided to the states under HAVA will have been disbursed.

Security - Numerous reports have been released by computer science experts that detail specific security flaws in electronic voting systems, particularly in voting systems software used in direct record electronic (DRE) or “touch-screen” voting machines. Due to these flaws, most of these experts recommend the use of an independent paper record to ensure that elections officials can audit election results, spot-check for accuracy, and re-count should electronic results be lost or compromised. They have also recommended various security procedures to ensure access to the voting machines is strictly controlled.

These reports have been criticized by the voting systems vendors and by some elections officials as offering unlikely and alarmist scenarios. They point out that, to date, there is no evidence that an electronic voting system has been hacked. They also point out that the creation of a paper record creates additional opportunities for mischief and management headaches for election workers. However, computer security experts warn a relatively unskilled hacker with even a few minutes’ access to the machines – either through physical contact or through a wireless connection – could change election results. Hacking aside, they point out that software errors, or errors that are made during the programming of the ballot into the machine to get it ready for a specific election, can lead to errors in the vote count. Up to now, it is these types of problems, rather than hacking, that have led to counting errors by electronic voting machines.

The 2005 VVSG includes technical standards related to electronic voting machine security, but some security experts say that the standards require additional scope and detail. In particular, they say that true security testing goes beyond running through a checklist of tests and should include actually trying different ways of breaking into a system to alter vote counts. This type of testing should be required and carried out routinely on voting systems, they say, before there will be any assurance that systems are truly secure. The 2005 VVSG also contains guidelines for the use of a voter-verifiable paper trail, should states decide to require one. Currently 27 states have chosen to do this. Another eight do not have the requirement although individual jurisdictions within those states have chosen this technology.

Testing –The 2005 VVSG consists of two volumes totaling 370 pages. *Volume I National Certification Testing Guidelines* describes the minimum capabilities, hardware, software, security, and functionality requirements that a voting system should have. This includes such topics human factors that affect the usability of these systems, requirements for ballot preparation and election programming, and environmental tolerances for heat, cold, and rough treatment such as dropping.

For a standard to be useful, there must be a test or tests to validate that it has been met. For this reason, *Volume II Voting System Performance Guidelines* contains procedural requirements for vendors and test labs and a high level description of the areas that shall be tested. However, it does not contain tests for every topic covered by the 2005 VVSG and therefore the 2005 VVSG will have to be updated with more detailed testing protocols. Currently the VVSG include protocols for the most basic varieties of environmental testing. For example, the guidelines describe a test (Section 4.6.5.2) where the equipment is heated for a specific period of time to ensure that variations in environmental conditions do not interfere with its basic functions, since equipment could be used or stored (up to months or years) under extremely hot (or cold) temperatures. In another section of the guidelines, standard tests from the International Electrical Code that are already in use are recommended to test for resilience to power disturbance, electromagnetic radiation, lightning surges, and other phenomena.(Section 4.8.1-4.8.8).

However, for more advanced matters such as software security, tests have not been fully detailed in the 2005 VVSG. For example Volume I has an extensive section on standards to protect the security of voting systems. Volume II's section on testing for security mostly relies on requiring the vendor to describe their own security testing, or on the test laboratory designing tests. Although there are tools used by the software industry to check software for errors, as well as malicious code, no specific techniques, procedures, de-bugging software or other tools are listed as mandatory for labs to test voting systems software to meet a security standard. However it is important to note that in the broader software industry software security testing is not particularly standardized because there is so much customization in software.

Usability - Electronic voting machines (i.e., computers, often with “touch screens”) have the potential to simplify voting and reduce errors. Their similarity to Automated Teller Machines (ATMs), which many people use on a routine basis, has made their use in the polling place more intuitive for many voters. Electronic voting machines can also be outfitted with devices to help the disabled vote without assistance. Nevertheless, problems with the design and set-up of voting machines, ballots, and the polling places themselves still can make voting a confusing and discouraging experience. But even when the machines are user-friendly and intuitive for voters, they may still remain problematic for poll workers who need to set them up and break them down on Election Day, and solve problems when voting machines do not perform as expected.

In May 2004, before the formation of the TGDC, NIST published a report entitled “Improving the Usability and Accessibility of Voting Systems and Products.” This report, often referred to as “the Human Factors Report,” detailed how research and best practices developed in human-machine, human-computer, and usability engineering disciplines could be applied to improve the usability of voting systems, both for voters and poll workers, and for the disabled community. The report noted that usability and accessibility were only partially addressed in the FEC voting systems standards, and made recommendations on how usability and accessibility could be addressed in the standards updates mandated by HAVA.

Background

A Brief History of Voting Standards - Before the passage of the Help America Vote Act (HAVA), voluntary voting systems standards were developed and promulgated by the Federal Election Commission (FEC). There were two versions of these standards, the 1990 version, and the 2002 version. These standards were developed by volunteers from the elections community that did not necessarily include a range of expertise on technical issues, such as security. The accreditation of the testing laboratories that tested equipment against the FEC standards was performed by the National Association of State Elections Directors. The FEC standards had been originally developed in recognition of the need for minimum performance requirements for voting technologies that were becoming increasingly complex and sophisticated. However, compared with most technical standards, these standards were more descriptive than prescriptive. The design of tests to comply with them was generally left to individual testing laboratories, resulting in differences in interpretation and application of the standards. For these and other reasons, HAVA included the language requiring the development more rigorous standards.

The 2005 VVSG used the 2002 FEC standards as a starting point, although they significantly expanded and refined them. HAVA transferred the responsibility for accrediting the testing laboratories to the newly created EAC, which would accredit laboratories upon the recommendation of NIST. These testing laboratories are now referred to as Voting Systems Testing Laboratories (VSTLs). NIST is evaluating prospective VSTLs through its National Voluntary Laboratory Accreditation Program. NIST will make recommendations to the EAC based on those evaluations about which laboratories to accredit.

VVSG Development and Approval Process - HAVA directed the TGDC to make recommendations to the EAC, which would then have the recommendations reviewed by the EAC Board of Advisors, a 37-member body drawn from federal, state, and local entities, and Congressional appointees, and by the EAC Standards Board, which is composed of 110 members drawn from state and local election officials. The first meeting of the TGDC was held July 9, 2004, and the TGDC has held regular meetings and teleconferences since that date. The TGDC submitted its recommended draft standards to the EAC May 9, 2005.

HAVA required a public comment period of unspecified length on the draft standards. The EAC held a 90-day public comment period during which time it received and reviewed over 6,000 comments on the proposed guidelines. The EAC made some changes to TGDC's recommended standards based on the public comment, and comments by the Board of Advisors and the Standards Board. The EAC voted to approve the final standards on December 13, 2005, while delaying their official effective date by 24 months to December 2007.

The TGDC continues to meet, as it believes there are major areas for improvement and expansion in the standards. In addition to the test suites to accompany the 2005 VVSG, the TGDC and NIST are working to update the VVSG for 2007, which will complete the standards and guidelines that were not fully addressed in the 2005 VVSG.

Recent Issues - Although the majority of new electronic voting equipment performed well in the 2004 election and in the 2006 primaries held thus far, some problems have occurred. During the

2004 election, the race for the post of agriculture commissioner in North Carolina had to be re-run because a problem in a voting machine caused it to stop counting votes. During the Indiana and West Virginia primaries this year, election officials in several counties had to manually count ballots because of programming errors in the equipment that tabulated the results from the voting machines. Recently tests in Utah revealed potential security vulnerabilities in one manufacturer's machines (see attached news article). Many new voting systems that have exhibited problems related to software errors had their systems evaluated and passed by testing laboratories, which did not catch these errors. This raises questions about how to improve software standards and testing for voting systems so that these types of errors are caught in the future.

Witness Questions

The witnesses were asked to address the following specific questions:

Ms. Donetta Davidson - Commissioner, Election Assistance Commission (EAC).

1. What is the EAC doing to encourage states to adopt the 2005 Voluntary Voting Systems Guidelines (VVSG)? How many states have adopted the VVSG for the 2006 election? How many states do you anticipate will adopt the VVSG for the 2008 election? Why are states adopting or failing to adopt the guidelines?
2. Does the EAC intend to update the VVSG? If so, when will they next be updated and what standards, testing procedures, and other technical issues will be considered as part of the update? What impact will these updates have on equipment already in use?
3. To what extent did you review the VVSG with respect to human factors and usability issues? To what extent do you think human factors and usability need to be addressed in updates of the guidelines?
4. What is the EAC's role in the approval of a certification process for Voting Systems Testing Laboratories (VSTLs) and what is the status of this process? When will the first VSTLs be approved?
5. What actions, in addition to establishing a process to certify VSTLs, does the EAC need to take to ensure that voting equipment meets the 2005 VVSG and future updates?

Dr. William Jeffrey - Director, National Institute of Standards and Technology (NIST).

1. What is the TGDC doing to update the 2005 Voluntary Voting Systems Guidelines (VVSG)? What are the primary gaps in the 2005 VVSG that need to be filled? To what extent would voting equipment still be subject to problems if it complied with the 2005 VVSG?
2. What is NIST doing to implement a certification process for Voting Systems Testing Laboratories (VSTLs) and what is the status of this process? How many testing

laboratories have applied for approval and when will recommendations for qualifying laboratories be submitted to the Election Assistance Commission (EAC)?

3. What were the findings and recommendations of NIST's 2004 report "Improving the Usability and Accessibility of Voting Systems and Products," which addressed human factors in voting? To what extent were those findings and recommendations reflected in the 2005 VVSG? To what extent do the 2005 VVSG and the 2004 human factors reports emphasize the importance of ease of use of voting systems for both poll workers and voters?

Ms. Mary Kiffmeyer - Secretary of State for Minnesota.

1. To what extent are the 2005 Voluntary Voting Systems Guidelines (VVSG) being used by Minnesota and why? If Minnesota is not adopting the 2005 VVSG, what standards are you using for voting equipment purchasing decisions and operation, and why did you select these standards?
2. Are the 2005 VVSG comprehensive enough to guide states' voting equipment purchasing decisions and voting systems operation during elections? If so, why, and if not, why not?
3. What do the Election Assistance Commission (EAC) and Technical Guidelines Development Committee (TGDC) need to do to make it more likely that states will update equipment using the latest VVSG? Do the 2005 VVSG need to be changed or improved in any way to make them more useful to the states? If so, what changes or additional information would you recommend for the VVSG? If not, why not?
4. How important are human factors, such as those described in the National Institute of Standards and Technology (NIST) 2004 report "Improving the Usability and Accessibility of Voting Systems and Products," in your selection of voting equipment? Is this report, together with the 2005 VVSG, having an impact on voting systems and elections, and if so, how? If not, why not?

Ms. Linda Lamone - Administrator of Elections, Maryland State Board of Elections.

1. To what extent are the 2005 Voluntary Voting Systems Guidelines (VVSG) being used by Maryland and why? If Maryland is not adopting the 2005 VVSG, what standards are you using for voting equipment purchasing decisions and operation, and why did you select those standards?
2. Are the 2005 VVSG comprehensive enough to guide states' voting equipment purchasing decisions and voting systems operation during elections? If so, why, and if not, why not?
3. What do the Election Assistance Commission (EAC) and the Technical Guidelines Development Committee (TGDC) need to do to make it more likely that states will update equipment using the latest VVSG? Do the 2005 VVSG need to be changed or

improved in any way to make them more useful to the states? If so, what changes or additional information would you recommend for the VVSG? If not, why not?

4. How important are human factors, such as those described in the National Institute of Standards and Technology (NIST) 2004 report “Improving the Usability and Accessibility of Voting Systems and Products,” in your selection of voting equipment? Is this report, together with the 2005 VVSG, having an impact on voting systems and elections, and if so, how? If not, why not?

Mr. John Groh - Chairman, Election Technology Council, Information Technology Association of America (ITAA); and Vice President of Marketing and Director of International Sales, Elections Systems and Software, Inc., a voting machine manufacturer.

1. To what extent are the 2005 Voluntary Voting Systems Guidelines (VVSG) sufficient to inform the development and manufacture of new voting machines? Is there additional information and guidance voting machine manufacturers need?
2. Do you believe that changes are needed to the 2005 VVSG, and if so, what are they and why are they necessary? If not, why not?
3. What does your industry need in terms of tests and other procedures to ensure that that your products meet these guidelines? Do you believe the current process for approval of Voting Systems Test Laboratories (VSTLs) for voting equipment will meet your needs?
4. How important are human factors, such as those described in the National Institute of Standards and Technology (NIST) 2004 report “Improving the Usability and Accessibility of Voting Systems and Products,” in your design of voting equipment? Did this report, together with the 2005 VVSG, impact your industry, and if so, how? If not, why not?

Dr. David Wagner - Professor of Computer Science, University of California at Berkeley.

1. What should the Technical Guidelines Development Committee (TGDC) and the Election Assistance Commission (EAC) do to improve the 2005 Voluntary Voting Systems Guidelines (VVSG)? What are the primary gaps in the 2005 VVSG that need to be filled? To what extent would voting equipment still be subject to problems if it complied with the 2005 VVSG?
2. What are the most effective and practical measures that election officials can take today to make existing voting systems as secure and reliable as possible in November?
3. Do the VVSG adequately address human factors and usability issues? Do you think that they need to be improved in this area? If so, why, and if not, why not?